

Country Review: USA

12th Micromachine Summit, Beijing, China
April 27-29, 2006



US Delegation: Michael Gaitan, NIST
Tom Cellucci, Zyvex
Cliff Fung, MIG
Steve Walsh, MANCEF
Sen Han, Veeco

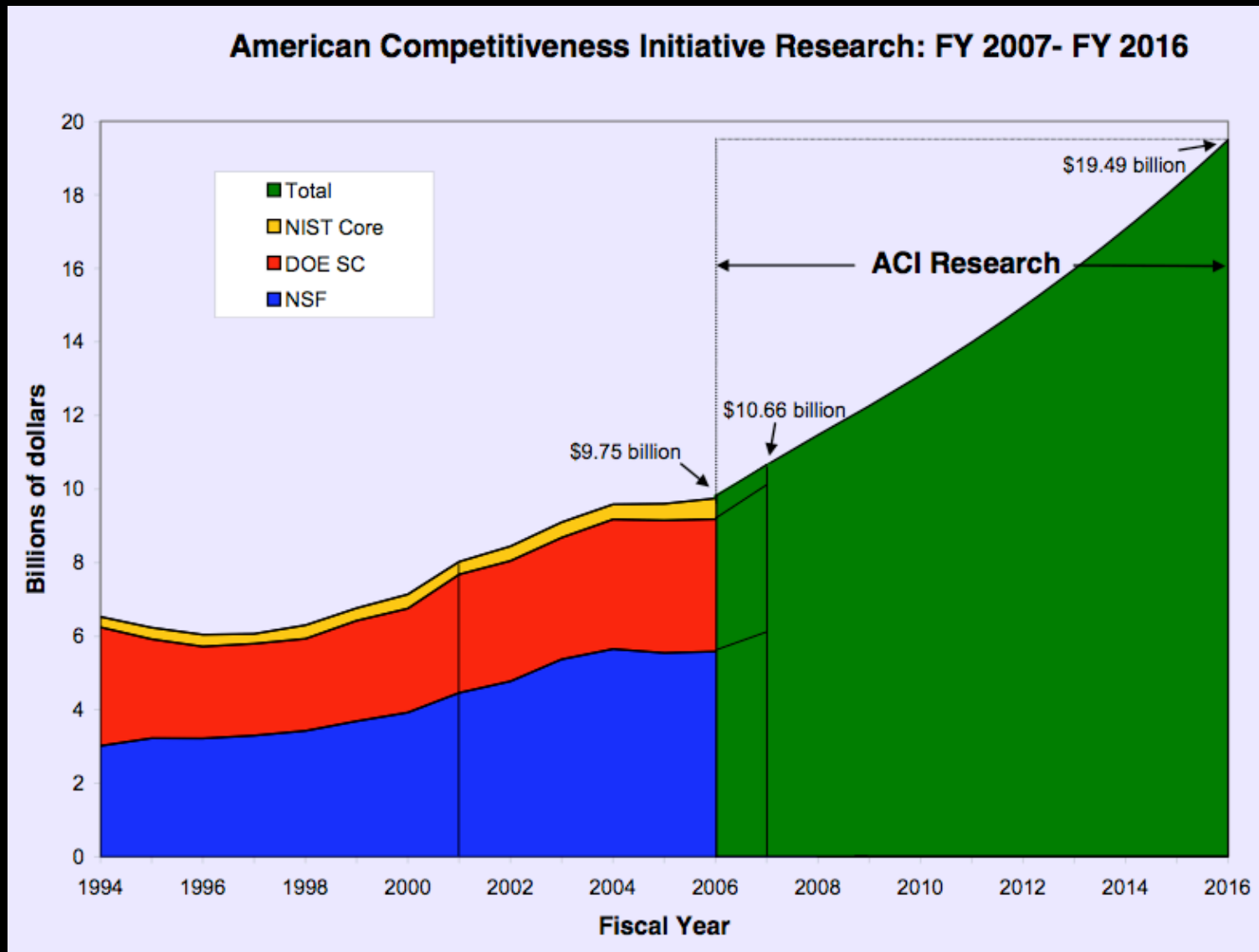
American Competitiveness Initiative

- 2007: \$5.9 B increase
 - R&D
 - Education
- Over the next 10 years
 - \$50 B increase in R&D
 - \$86 B increase in tax incentives



State of the Union address Jan 06

American Competitiveness Initiative



US Investment in Nanotechnology

NNI Budget Overview by Agency

(dollars in millions)

| Agency | 2004 Actual | 2005 Actual | 2006 Estimate | 2007 Request |
|----------------|-------------|-------------|---------------|--------------|
| NSF | 256 | 338 | 344 | 373 |
| DOD | 291 | 257 | 436 | 345 |
| DOE* | 202 | 210 | 207 | 258 |
| HHS (NIH)* | 106 | 142 | 175 | 173 |
| DOC(NIST) | 77 | 75 | 76 | 86 |
| NASA | 47 | 45 | 50 | 25 |
| USDA* | 2 | 3 | 5 | 5 |
| EPA | 5 | 5 | 5 | 9 |
| HHS (NIOSH) ** | | 3 | | |
| DOJ | 2 | 2 | 1 | 1 |
| DHS (TSA) | 1 | 1 | 2 | 2 |
| TOTAL | 989 | 1081 | 1301† | 1277 |

source: <http://www.nano.gov>

United States Federal Government investment in nanotechnology R&D

1997: \$116 M

2004: \$989 M

2005: \$1081 M

2006: \$1301 M

2007: \$1377 M

65% of funding supports academic research

National Nanotechnology Infrastructure Network (NNIN)

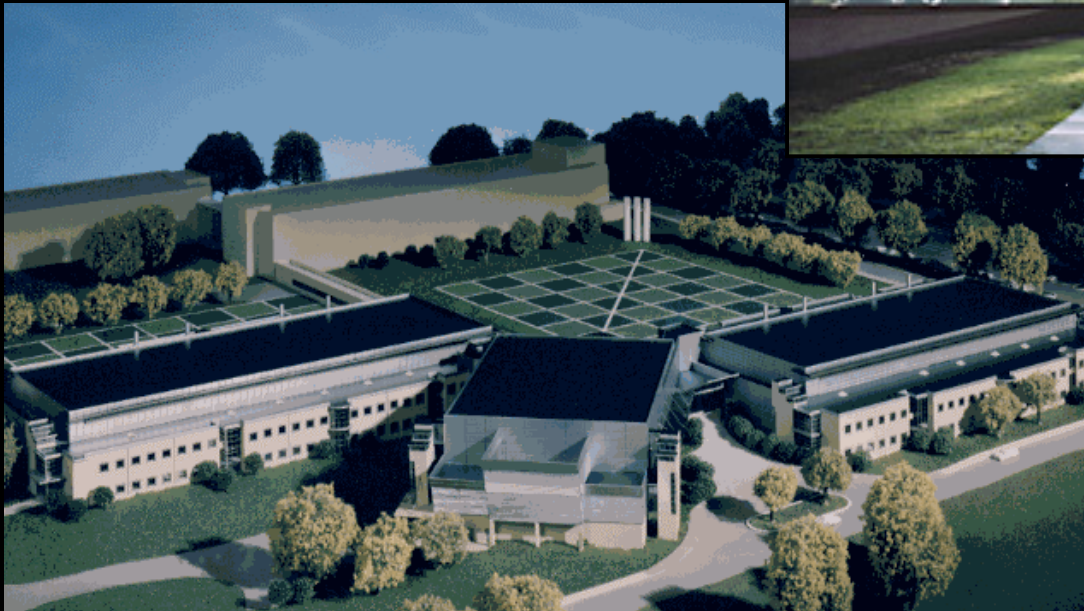
- The Cornell Nanoscale Facility at Cornell University
- The Stanford Nanofabrication Facility at Stanford University
- The Solid State Electronics Laboratory at the University of Michigan
- The Microelectronics Research Center at the Georgia Institute of Technology
- The Center for Nanotechnology at the University of Washington
- The Penn State Nanofabrication Facility at the Pennsylvania State University
- Nanotech at the University of California at Santa Barbara
- The Minnesota Nanotechnology Cluster (MINTEC) at the University of Minnesota
- The Nanoscience at the University of New Mexico
- The Microelectronics Research Center at University of Texas at Austin
- The Center for Imaging and Mesoscale Structures at Harvard University
- The Howard Nanoscale Science and Engineering Facility at Howard University
- The Triangle National Lithography Center at NCSU (DUV lithography only)

National Nanotechnology Infrastructure Network (NNIN)

- [illegible]

NIST: Center for Nano Science and Technology (CNST)

Co-locate nanofab
with national
measurement facilities



Commercial Sector

Integration

- Affymetrix
 - Gene Chip Arrays (Small Times Product Award)
- E Ink
 - Digital Ink (Small Times Company Award)
- Zyvex
 - Nanomanipulators
- Avago Technologies
 - Integrated FBAR Technology
- Akusica
 - Single Chip Microphones

United States Measurement System

NIST Study

- Workshop on Micro Nano Technologies was held at MIG's METRIC Meeting, Sept 2005
- Report on measurement needs
 - Trusted Protocols for Package Integrity Testing
 - Material Property Measurements
 - Methods for Evaluating and Assuring the Field Reliability of RF-MEMS Devices
 - Atomic-Precision Imaging for Development of New Materials
 - Microfluidic Metrology for Lab-on-a-Chip Cell-Based Analysis
 - Enabling Metrology for Top-Down Nanomanufacturing

<http://usms.nist.gov/>



Robocup

Nanogram League (Proposed)

- “The game of soccer was the original motivation for RoboCup. Besides being a popular worldwide sport, therefore an appropriate medium to attract people to an event, it contains a significant set of challenges for researchers”
- Leagues
 - Humanoid
 - Middle Size
 - Small Size
 - Four-Legged
 - Rescue Robot

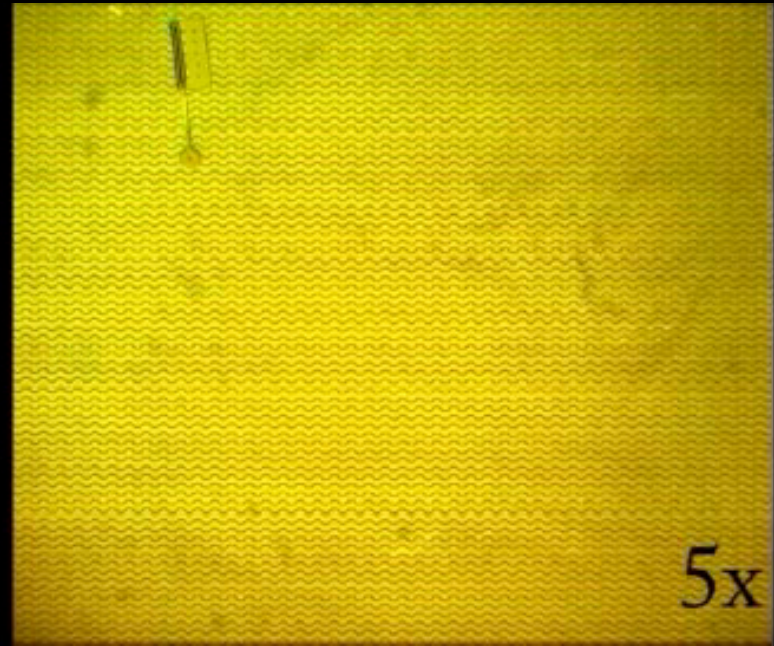


<http://www.robocup.org>

Robocup

Nanogram League (Proposed)

- A new Robocup league for Microrobots (proposed)
- Demo will be at the next Robocup in Bremen, Germany 14-20 June 2006
- If approved, the first competition will be at the next Robocup June 2007

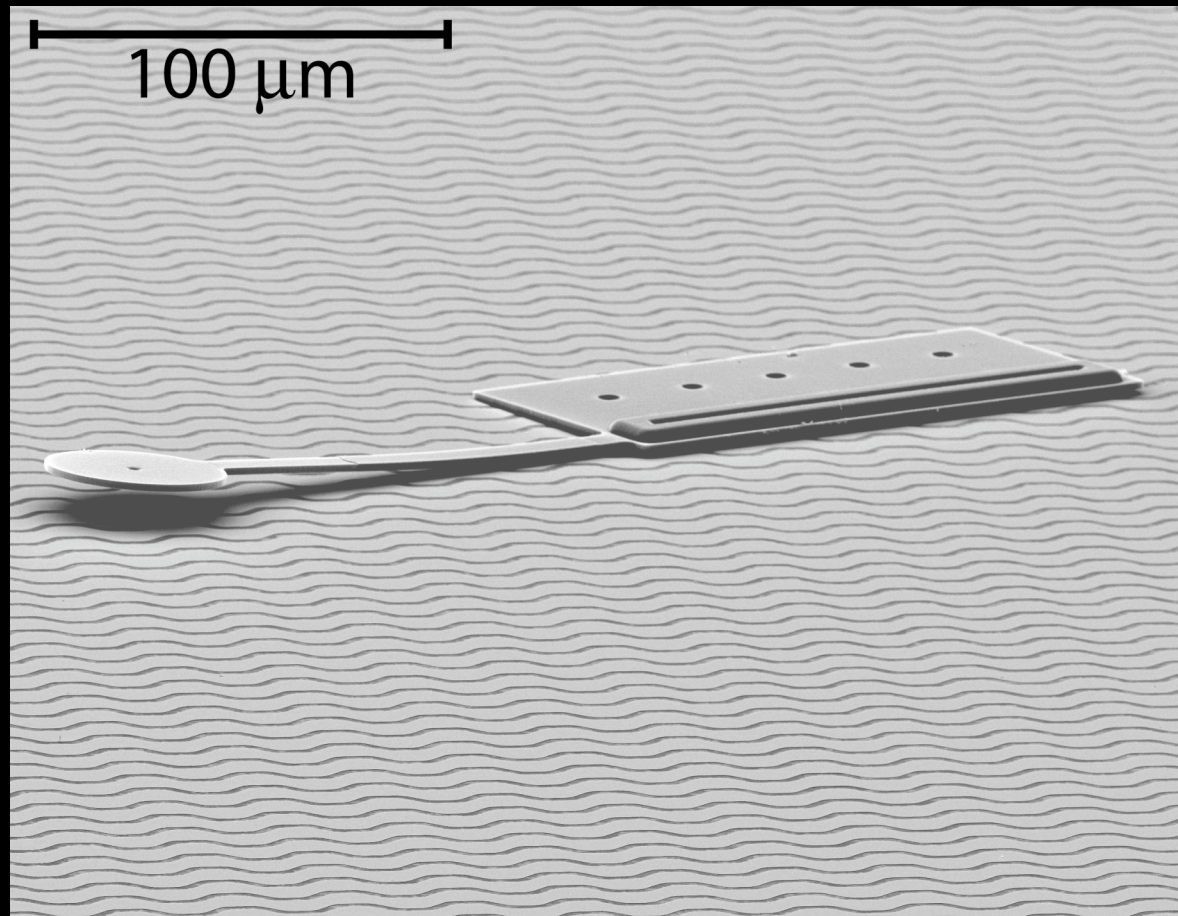


Committee: Craig McGray, Adam Jacoff,
Michael Gaitan, Fumihito Arai, Satoshi Tadokoro

<http://www.robocup.org>

Robocup

Nanogram League (Proposed)



Thank You!

Talk can be viewed online at:

<http://mems.nist.gov/Talks/USA2006.pdf>